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come epiphyllous, and I was surprised to find such Lichens as *Usnea florida*, *Sticta aurea*, and species of Leptogium, of Parmelia, of Theloschistes, and of Lecanora growing as epiphylls. However, I do not think that anyone ever thinks of these as characteristically leaf-inhabiting Lichens. Some individuals of these Lichens, in such a favorable climate, become epiphyllous merely by accident. Many other Lichens, on the contrary, seem peculiar to leaves, and were never found anywhere else. Such Lichens I would call truly epiphyllous Lichens. The leaves of some plants evidently furnished ideal substrata, whereas the leaves of other plants never harbored a single sp cimen. The leaves of Podocarpus, for example, were literally covered with epiphyllous Lichens.

Only a few of these strictly epiphyllous species have thus far been determined. Among these are a Pyrenula-like species, evidently, *Pyrenula* (*Porina*) *epiphylla*, occurring on Podocarpus; an Opegrapha, which seems to be *O. phyllobia*, on Callistemon; and *Pilocarpon tricholoma*, growing on cypress.

Another interesting phase of my study of the Lichens of Cinchona, was listing the number and kinds of species growing on each of the various trees and shrubs, and on the buildings around the garden. Thus on a rose-bush near the house grew the following: *Usnea florida*, *Lecanora varia*, *L. subfusca*, *Ramalina* sp., *Parmelia* sp., *Lecidea* sp., *Usnea hirta*, *Graphis* sp., *Pertusaria* sp., *Collema* sp., and *Haematomma puniceum*.

The bamboos were singularly free from Lichens, and yet on nearly all of them grew *Opegraphela filicina*.

A comparative study was made of the Lichens found on a Cryptomeria and those found on two Junipers. One might think that the Cryptomeria would harbor practically the same species that were found on the Junipers. But there were marked differences. Cryptomeria was very sparsely inhabited by Graphis, Arthonia, Lecanora, and Pertusaria. On the other hand, it seemed to be the ideal host for a Calicium, and for a species of Lecidea. Again, Parmelia found the Cryptomeria to its liking, whereas, Sticta preferred the Junipers.

I was rather surprised to find that over 20 species of Lichens grew on the roof of our laboratory. Usnea species, and Cladonia species predominated, but it seemed that almost any Lichen might be expected; any species that could live on old wood, on rotting wood, or on humus.

UNIVERSITY OF MARYLAND,
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SPHAGNUM USED AS A SURGICAL DRESSING IN GERMANY DURING THE WORLD WAR

J. W. HOTSON

During the recent war much attention was given, especially in Great Britain, to the making of surgical dressings from sphagnum moss. Even before the United States entered the war these dressings were in quite general use in the

British Army hospitals on practically all the allied fronts. As a rule the American surgeons did not take kindly to the type of sphagnum pad made by the British, so that shortly after our entrance into the war the American Red Cross as well as private individuals undertook rather extensive experiments in an effort not so much to improve the efficiency of the dressings as to make them in a form that might be more acceptable to the American surgeon. A brief account of the results of some of these experiments, including the methods of gathering, storing and cleaning the moss, as well as a rather detailed account of making the dressings, has been published.[1]

In these articles it has been shown quite definitely that the value of sphagnum for surgical dressings lies largely in its power to absorb an excessive amount of fluid, which in some species is as high as twenty times the dry weight. The mechanism by which this is made possible consists of the large, empty, perforated cells in the stem and leaf, especially in the latter, as shown in figures 5–8.

Many of us who were working with sphagnum in this country have wondered how the Germans used it as a surgical dressing. Most of the following information on the subject was obtained directly from Berlin through the kindness of the German Red Cross.

Like many great discoveries and inventions the value of sphagnum as a surgical dressing was discovered, at least as far as the medical profession of Germany was concerned, by sheer accident. Prior to this discovery sphagnum doubtless was used locally as a dressing for wounds as it was in Scotland and Ireland, but its approval and sanction by members of the medical profession was not established until the latter part of last century. It was Neuber, a surgeon at Kiel, in 1882, who published the following remarkable story.

In the early eighties of last century a workman at one of the outlying peat moors in north Germany accidentally sustained a severe lacerated wound of the forearm. In the absence of anything better to apply to the wound, his fellow-workmen wrapped it up with fragments of peat which were lying near, and after an interval of ten days he arrived at the surgical clinic at Kiel with the original dressing undisturbed. It was feared that the wound when examined would be found in a very unsatisfactory state, but, on the contrary, when the peat dressing was removed, the wound was found to have healed in a most satisfactory manner. The unexpected result obtained with a dressing material which, at first sight, seemed so unpromising led to a very careful inquiry into its nature and properties.

An investigation of the growing plant on the surface of the bog, down through the various stages of decay to the brown amorphous depths below, was made from the physical, chemical and bacteriological points of view. The practical outcome of this inquiry was that the value of sphagnum as a surgical dressing was found to be due to its marvellous power of absorbing fluids. It was found that the growing plant collected and dried had this power at the maximum, but

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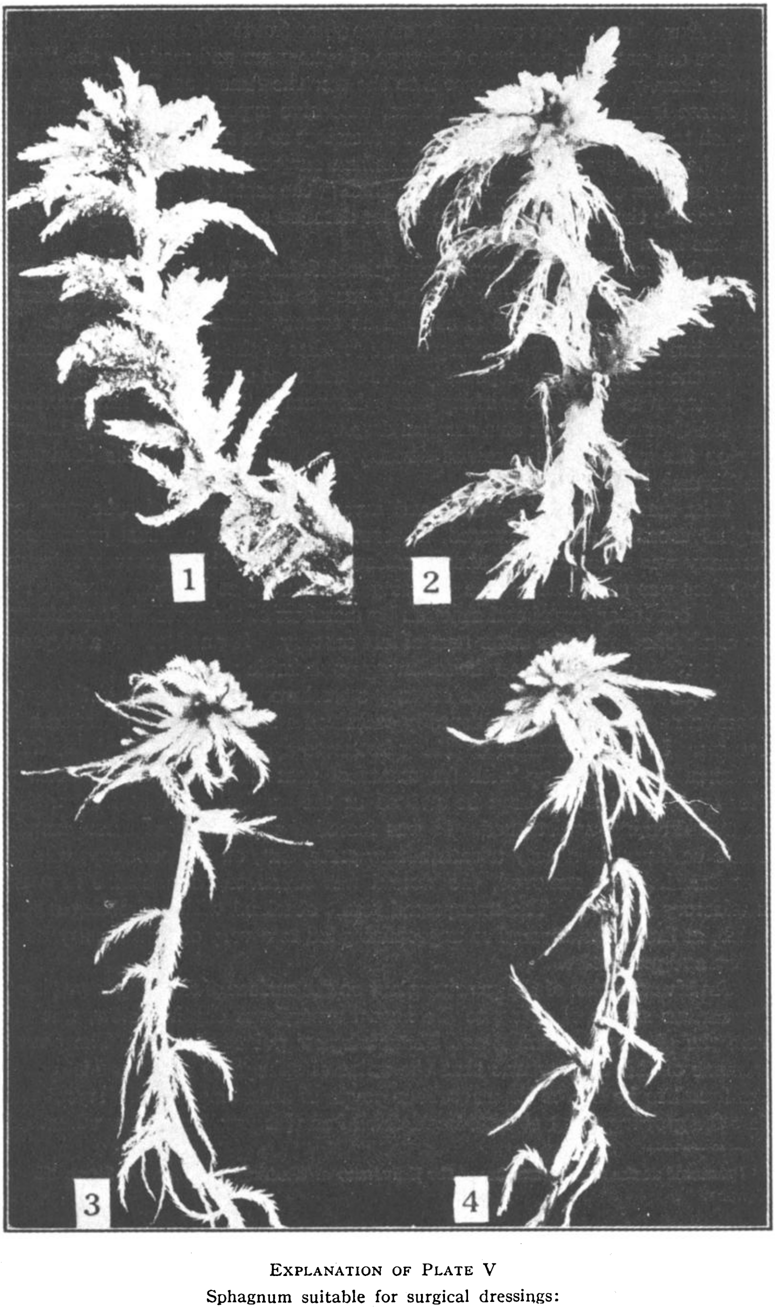
[1] Presented at the regular meeting of the University of Washington Chapter of Sigma Xi. Feb. 16, 1921.



EXPLANATION OF PLATE V

Sphagnum suitable for surgical dressings:

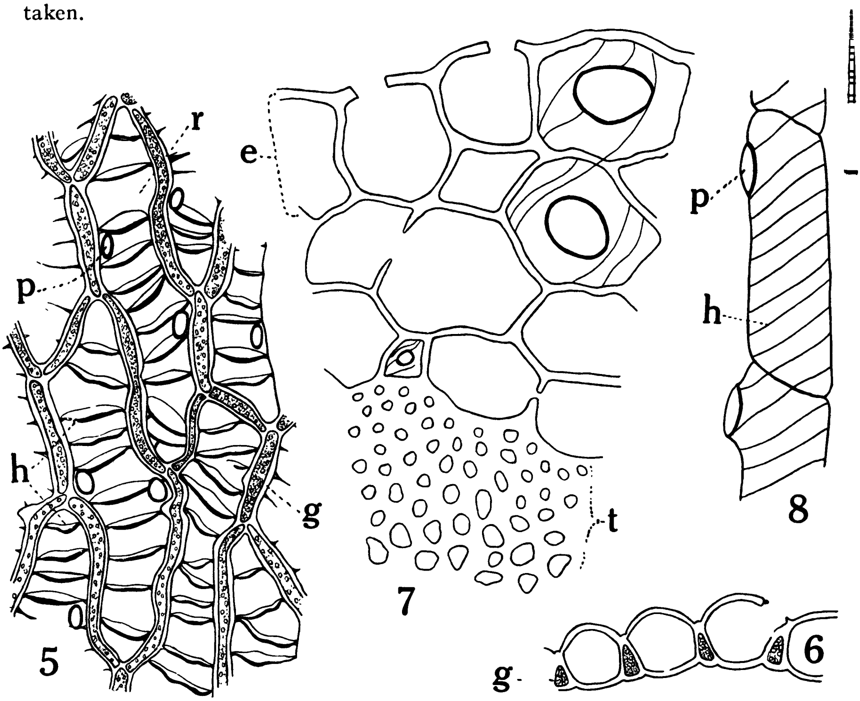
FIG. 1. *Sphagnum imbricatum.* FIG. 2. S. *palustre.*

Sphagnum not suitable for surgical dressings:

FIG. 3. *S. recurvum.* FIG. 4. *S. fuscum.*

(From photographs by Prof. T. C. Frye)

the light brown layers of semi-decayed moss which lie above the peat proper retain great absorptive powers also. It is probable, however, that it was from the partly decayed material that the temporary dressing just mentioned was taken.



SPHAGNUM PALUSTRE

e, epidermis; *g*, green cells containing chlorophyll; *h*, hoop-like bands, *p*, pores or openings into the reservoir cells; *r*, reservoir cell; *t*, thick-walled cells that constitute the wiry center of the stem.

FIG. 5. Surface view of a portion of a leaf. x 300.
FIG. 6. Part of a cross-section of a leaf. x 275.
FIG. 7. Part of a cross-section of a stem. x 300.
FIG. 8. Reservoir cells from epidermis of a branch. x 225.
(From drawings made by Miss Agnes Carlson).

Thus, before the World War began, the value of sphagnum for surgical dressings was known to the majority of surgeons in Germany, although it was not used to any great extent until the war broke out. These facts were also known in a general way by the British and French surgeons, as well as to a few American surgeons.

This was practically the sphagnum situation at the outbreak of the war in

1914. Very little was known in this country as to what use the Germans were making of sphagnum during the war until after the war was over. We now know that they were quite as active, if not more so, in utilizing sphagnum for dressings and other purposes, as the Allies were. Their necessity, of course, came first and their use of this and other material as a substitute for cotton was quite general in some regions, especially on the Russian front.

During the war, Germans made surgical dressings or pads not only of sphagnum moss, but also of common moss, wood pulp, peat, sawdust, wood ashes, peat ashes, hay, straw, surgical lint mixed with different proportions of sphagnum, and even algae and any kind of cellular material that was available.

These materials were usually sewn up in small pillows or muslin sacks, disinfected and used as bandages for wounds that were discharging excessively.

[*To be concluded*]

REVIEW[1]

POTTIER, JACQUES. RECHERCHES SUR LE DEVELOPPEMENT DE LA FEUILLE DES MOUSSES. [Studies on the development of the leaves of mosses.] Pp. 1–137, figs. 1–368, pls. 2. Paris, 1920.

The major part of this work is a detailed description of the cross-sections of moss leaves, longitudinal surface views, and leaf reconstructions in plastiline. The 368 figures are more than sufficient to illustrate the essential features of the text. The indices of the figures are not explained on the various plates or in the "Explication des figures." In order to find out what the indices mean it is necessary to hunt through the text. In *fig. 193* the primordial cells of the conducting tissue are shaded gray, while in other figures gray is used for a different type of cells, an inconsistency that might easily lead to confusion. The bibliography, which includes 43 citations, appears to be incomplete for a subject so often studied, especially so when no American or English papers are included.

In the historical review it is stated that Charles Morren in 1840 was the first to study the development of moss leaves. [Brown, R. Trans. Linn. Soc. **12**: 575. 1819, describes the development of the leaves of *Fissidens*, as cited by Salmon.] From 1845–1855, M. J. Schleiden and Carl Nägeli were engaged in a controversy pertaining to the initial development of the leaf. Hofmeister, in 1851, describes the development of young leaves in *Sphagnum* with an initial cell having two faces, with which the formation of leaves in a number of other mosses are compared. In 1863, Lorentz studied the development of the midrib of moss leaves by means of cross-sections and confirms the earlier conclusions of R. Brown with regards to the early development of the leaves of *Fissidens*. [SALMON, E. S. On the genus Fissidens. Ann. Bot. **13**: 103–130. 1899, also confirms the early conclusions of R. Brown.] In 1867 Lorentz provides the first technical terms for the histological elements of the moss leaf. Leitgeb in 1874

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[1] Contribution from the Department of Botany, University of Pittsburgh, No. 3.